PROJECT: HYDROPOWER PLANT “BOSKOV MOST”

NONTECHNICAL SUMMARY

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Acronyms and glossary

CO_2 equivalent -	Measure for describing how much global warming a given type and amount of greenhouse gas may cause, using the functionally equivalent amount or concentration of carbon dioxide (CO_2) as the reference.
Cumulative effects -	The total change in the environment that result from numerous human-induced, small-scale alterations
Dissolved oxygen (DO) -	Measure of the amount of oxygen that is dissolved or carried in a given medium, in this case in reservoir water
EBRD –	European Bank for Reconstruction and Development
EIA -	Environmental Impact Assessment
ELEM -	ELEKTRANI NA MAKEDONIJA AD (State owned company engaged in electrical power generation)
Erosion –	The process of weathering and transport of solids (sediment, soil, rock, and other particles) from their source to another location.
ESAP -	Environmental and Social Action Plan
ESIA –	Environmental and Social Impact Assessment
EU -	Europe Union
Gigawatt hours -	Unit of electrical energy equal to 10,000,000,000 watt hours
Greenhouse gases (GHG) -	Gas in an atmosphere that absorbs and emits radiation within the thermal infrared range
Groundwater -	Water found underground in porous rock or soil strata
Headrace tunnel –	Channel transporting water from the reservoir/siphon to the penstock
HPP –	Hydropower plant
Intake –	The structure that captures from the river so it can be used for power generation
KVA –	Kilovolt ampere - unit used for the apparent power in an electrical circuit
LACF –	Land acquisition and compensation framework
MEPSO –	FYR Macedonian operator for transmission of electricity
Minimum Biological Flow –	The amount of water in a river that is necessary for normal aquatic biodiversity
MWe –	Megawatt electricity
NTS –	Non-technical summary
Peak Load Generation –	Generation of electricity only when there is high demand, which balances the energy supply
Penstock -	Gate or intake structure that controls water flow, or an enclosed pipe that delivers water to hydraulic turbines
Pressure head-	Internal energy of a fluid due to the pressure exerted on its container, at Boskov Most HPP by the change in elevation from intake to turbine.
RES -	Renewable energy sources
Sedimentation -	tendency for particles in suspension to settle out of the fluid in which they are entrained, and come to rest against a barrier
SEP –	Stakeholders Engagement Plan
Siphon -	The flow of liquids through tubes, in an inverted U shape which causes a liquid to flow uphill without pumps, powered by the fall of the liquid as it flows down the tube under the pull of gravity, and is discharged at a level lower than the surface of the intakes
Stratification and turnover	Stratification is when water in a lake has layers with different temperatures or other characteristics. The layers disappear when the becomes mixed during an occasional turnover

Surge tank - Storage reservoir at the downstream end of a closed aqueduct or feeder pipe to absorb sudden rises of pressure as well as to quickly provide extra water during a brief drop in pressure

1 Introduction

ELEKTRANI NA MAKEDONIJA AD ("ELEM"), a State-owned company engaged in electrical power generation, is proposing to construct and operate the Boskov Most Hydropower Project. The project will be located 123 kilometres west of Skopje on the river Mala Reka in the west part of the Republic of Macedonia (Figure 1, left), near the town of Debar in the districts of the municipalities of Debar and of Mavrovo and Rostuse. The Mala Reka forms the southwest boundary of Mavrovo National Park, and most of the project will be located in the Park.

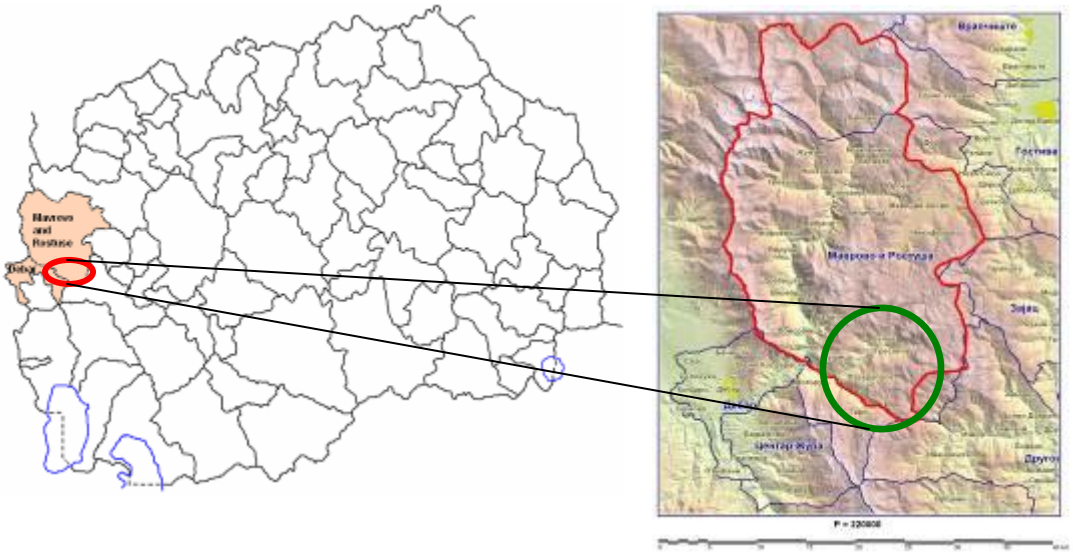

Figure 1. Location of the project in Macedonia and Mavrovo National Park

ELEM has prepared an Environmental and Social Impact Assessment (ESIA) to evaluate the potential impacts the project could have on people and the environment. This Non-Technical Summary (NTS) presents major findings of the ESIA. The NTS is part of a larger package of documents, including the ESIA study, Stakeholder Engagement Plan (SEP), Land Acquisition and Compensation Framework (LACF), and Environmental and Social Action Plan (ESAP).

All of these documents are available for review and comment at the following places:

- ELEM's headquarters in Skopje (AD ELEKTRANI NA MAKEDONIJA (ELEM) 11 Oktomvri No.9, 1000 Skopje, Macedonia);
- Ministry of Environment and Physical Planning, Public communication office and Unit for Environmental Impact Assessment (Blvd. Goce Delcev bb, MRTV, 10-11-12 floor, 1000 Skopje, Macedonia);
- Offices of the Municipalities of Mavrovo and Rostuse-(254 Rostuse, Macedonia) and Debar (8 Septemvri 72, 1250 Debar, Macedonia)

- Mavrovo National Park (address: Mavrovi anovi, 1254 Mavoro and Rostuse, Macedonia, www.npmavrovo.org.mk).
- European Bank for Reconstruction and Development (EBRD) Resident Office in Skopje (Soravia Centre Skopje, 7th floor, Vasil Adzilarski b.b., 1000 Skopje)
- EBRD Headquarters (One Exchange Square, London EC2A 2JN, United Kingdom)

The full ESIA report is also available on the websites of ELEM (www.elem.com.mk) and of the Ministry of Environment and Physical Planning (www.moepp.gov.mk.). Electronic versions of the NTS, SEP, LACF and ESAP (in English and Macedonian, with the SEP and NTS also in Albanian) are available on the websites of ELEM and the European Bank for Reconstruction and Development (www.ebrd.com).

Anyone can make comments on the ESIA study and the project. The Macedonian public review and comment period will last for 30 daysfrom the date of public disclosure. The EBRD review and comment period will be 120 days from the date of public disclosure. Comments may be delivered to or submitted by mail to ELEM or the Ministry of Environment and Physical Planning at the addresses shown above, or by email to ELEM at boskov.most@elem.com.mk. There will also be public meetings in Skopje, Debar, and Mavrovo – Rostuse at which the Ministry and ELEM will present information and receive comments about the ESIA. The dates and times of these meetings will be advertised in newspapers and announced with notices on bulletin boards.

2. Why is the project needed?

Construction of HPP Boskov Most will increase the electricity supply in Macedonia, and it will do so without generating significant greenhouse gases.

Boskov Most HPP will increase the share of renewable energy sources within the country's electrical generation system. To meet goals set by the European Union, Macedonia needs to increase the share of renewable sources to at least 21 percent of all electricity. The 2010 national strategy for energy development (*Ministry of Economy, 2010)* concluded that Macedonia would need to construct additional hydropower power plants, including HPP Boskov Most. In this and other energy-related strategies, the construction of HPP Boskov Most by 2020 was included, with no exceptions or delays.

3. Legal and Administrative Framework

The Environmental and Social Impact Assessment process is intended to serve as a primary input for the decisionmaking process by Macedonian authorities, which have to approve the project before it can be constructed and operated, and by the European Bank for Reconstruction and Development (EBRD), which is considering providing funding for the project.

Macedonian Framework

The Law on Environment (Official Gazette of RM no. 53/05, 81/05, 24/07, 159/08, 83/09, 48/10 and 124/10) requires the development of Environmental Impact Assessment (EIA) for certain projects. The Boskov Most HPP is of a category covered by Annex 1, item 12 – Hydro technical projects (Official Gazette of RM no.74/05).

The EIA study is required to provide identify and describe how the project can have negative and positive impacts on environmental resources – water quality, animals, fish, plants, etc.. – and on people – economic status, noise, traffic, etc. The EIA has to be carried out by authorized experts in accordance with the established methodology, notification structure and required documents. Public participation is required throughout the process.

EBRD Framework

EBRD's charter requires its activities to be environmentally sound and promote sustainable development. To make sure that projects meet this standard, EBRD's 2008 Environmental and Social Policy, including 10 Performance Requirements, requires all projects funded by the Bank to meet the standards of the European Union and best international practices. EBRD has classified the Boskov Most HPP as Category A (the highest), which requires a full Environmental and Social Assessment.

4. Purpose and Scope of this ESIA

Overall, the purpose of this ESIA is to ensure that future activities related to this Project (e.g. design of HPP Boskov Most during construction and operation) will be performed in a socially and environmentally acceptable manner, in compliance with Macedonian legislation as well as EBRD Performance Requirements and best international practice. Key elements of the scope of this ESIA therefore were to:

- Initiate a consultation process with potentially affected people and relevant stakeholders to inform them about the Project and identify their concerns;
- Identify key environmental and socio-economic issues;
- Describe environmental and socioeconomic baseline conditions;
- Evaluate potential impacts (positive and negative) of the Project;
- Develop design and operating practices that will avoid, reduce, or compensate for significant environmental and social impacts;
- Develop monitoring programs to verify the Project is constructed and operated as intended, and to identify changes in environmental controls that may be needed.

5. Considered Alternatives

The proposed project is described in section 5 below. From the first project planning in the 1980s, a number of different alternatives were considered, including:

- With and without a dam and a storage reservoir.
- Different locations of the dam and reservoir.
- Different dam types and heights, and different layouts of associated structures.
- Different routes, types, and dimensions of the water tunnel from the dam to the powerhouse, and different locations of the water collection system.
- Water collection system on the southern side of the Mala Reka
- Different locations of the powerhouse and related structures and the connection of the powerhouse to the electricity grid.

6. Description of the Project

The Boskov Most HPP will generate 70 megawatts of electricity, about 126 Gigawatt-hours per year, using water from the river Mala Reka and its tributaries. As can be seen in Figures 2 and 3, the Boskov Most HPP has many parts that are widely spaced. A dam 33 meters high will be constructed in a narrow gorge about one kilometre from Tresonce and Selce villages on the Mala Reka just downstream of where the rivers Jadovska Reka and Tresonecka Reka come together. Water will be taken from local tributaries of the Mala Reka at locations Tresonce, Selce, Rosoki, Lazaropole, Mogorce, Osoj, and Gari villages. Water from the tributaries will be carried to the tunnel and reservoir in aqueducts and siphons.

The reservoir will cover about 22 hectares, of which about 15 hectares are now used for pastures and the rest is forested. The headrace tunnel will be excavated in the hillside on the right side of the Mala Reka and will flow 8.7 kilometres to a surge tank. From the tank, water will flow another 0.85 kilometres through two buried pipelines down to the power house, which is 365 meters lower than the reservoir and is located on the right side of the Mala Reka just before it flows into the Radika River. The plant will operate for about five hours per day. After passing through turbines to generate electricity, the water will be returned to the Mala Reka about 200 meters upstream from where it joins the Radika River. Where the discharge channel enters the Mala Reka, there will be a concrete river bank protection structure and the stretch of the river down to the Radika will be dredged and controlled. In addition, a transformer station and 110kV overhead power line will connect the powerhouse to the national grid. The route by which this connection will be made into the grid is not yet fully determined. Once a decision is made, it will be determined if a separate impact assessment will be needed for the transmission line.

The project also includes major roadworks, including:

- Reconstruction and widening of 7.5 kilometres of the existing road for the village

of Tresonce, from the Gari-Tresonce crossing to the village Tresonce. This will include upgrades to two existing bridges at the Tresonecka and Garska rivers and three new bridges.

- Reconstruction and widening (again by 4.4 meters) of 985 meters of the existing road from the Rosoki - Tresonce crossing to Rosoki village, including two new bridges.
- Construction of a new road from Rosoki village for 4.2 kilometres, with a short branch to the siphon.
- Construction of a new road for 3.7 kilometres from a construction site near the Tresonce siphon to the surge tank (3.7 kilometres), again with a short branch.
- dislocation of the present road to the village of Tresonce - Dam Tresonce, in a length 1.8 km
- dislocation of the section of the existing road to the village Selce, in a 400m length.

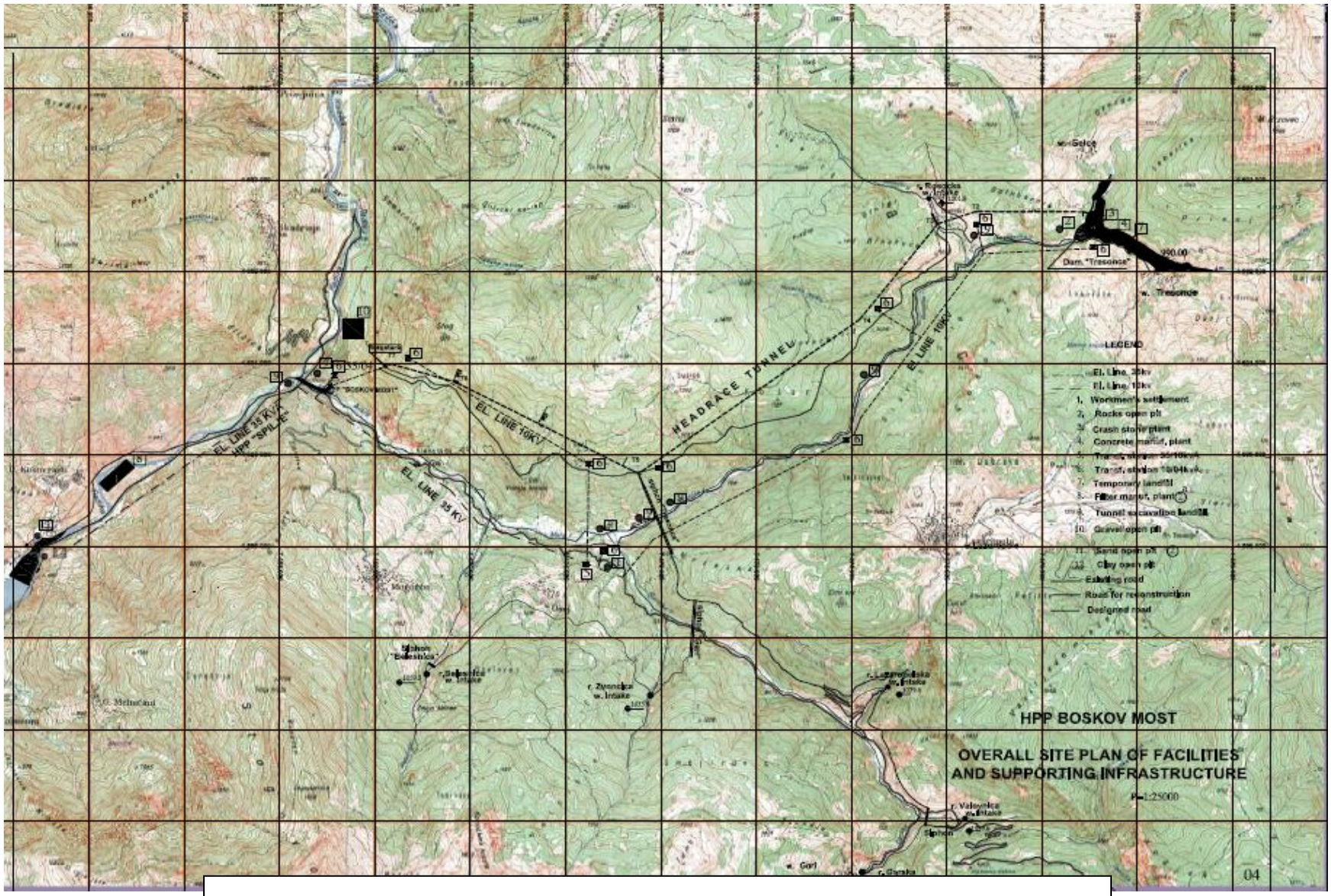

Figure 2. This figure shows where the different parts of Boskov Most HPP will be located

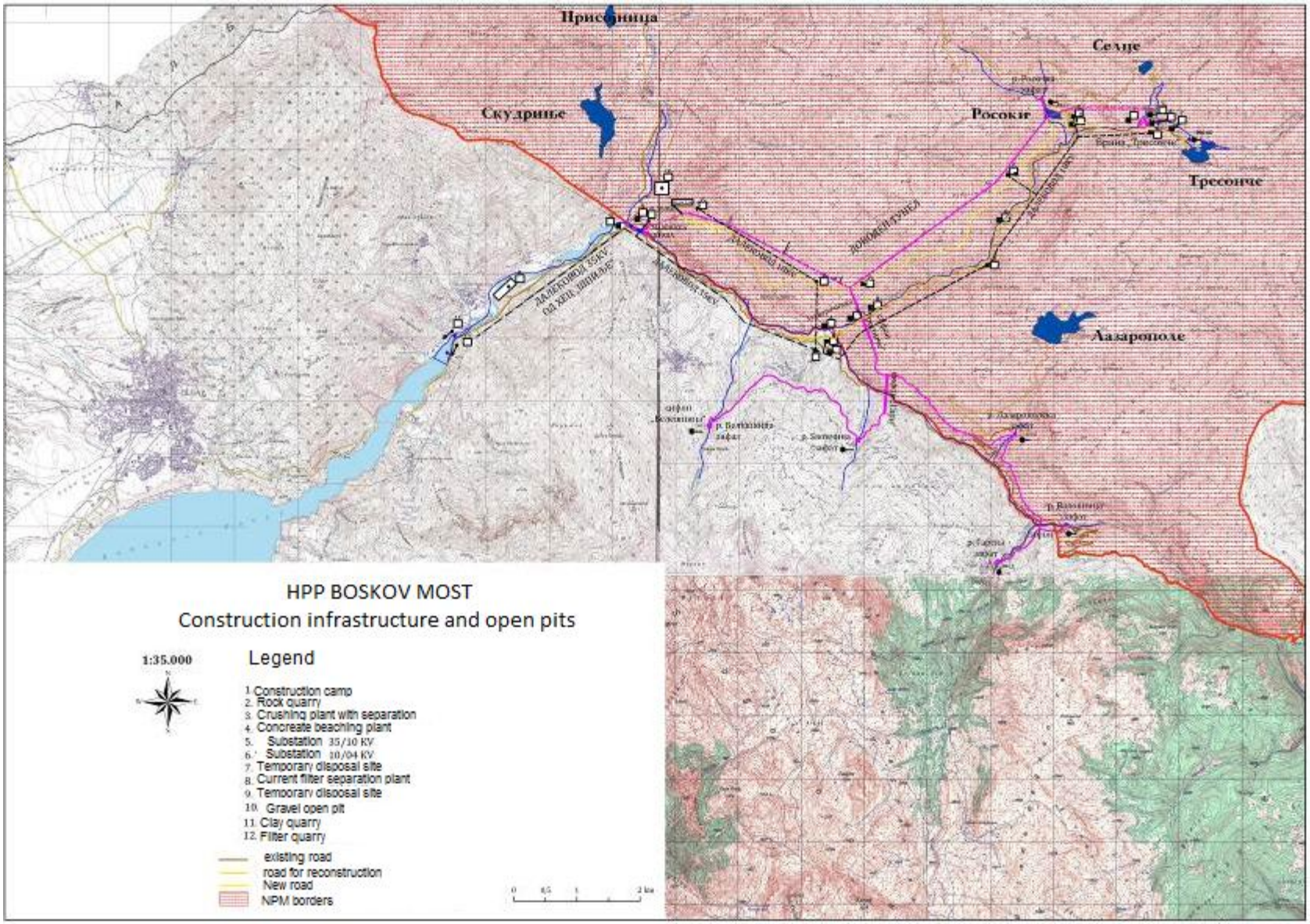

Figure 3. This figure shows the different parts of Boskov Most HPP shows which parts are in Mavrovo National Park (red shading)

- Construction of a new road for 0.7 kilometre from Rosoki village to the intake on the river Rosocka.

The two reconstructed roads will be widened by 4.4 meters to a new width of 7.9 meters. New roads will be 3 meters wide and 44 centimeters thick (30 cm gravel, 10 cm bitumen, and 4 cm asphalt concrete). The roadworks are shown on Figure 4.

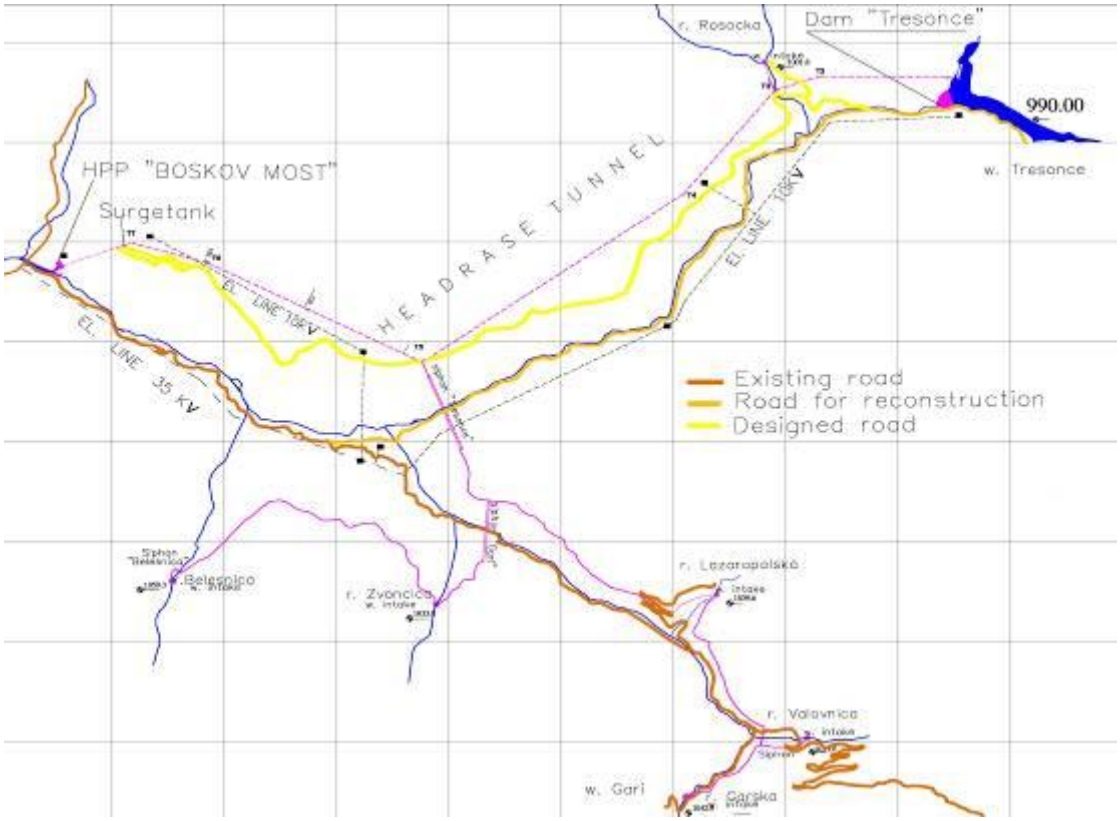

Figure 4. Roads that will be newly constructed or improved

Construction of Boskov Most HPP will take four years, with work taking place for eight months per year, from March to October. A total of about 885 workers will be employed on the site at different times. Table 1 shows the approximate number of workers that will be needed at each of the construction sites, the number of shifts per day and the number of months construction will take. Workers will live in a work camp near the center of the project site in the vicinity of the confluence of the rivers Garska and Mala Reka.

Table 1. Estimated details for construction sites: shifts, months, and workers

	Dam	*Dam outlet structures*	*Water channels*	*Headrace tunnel*	*Powerhouse*	*Roads*
Shifts per day	2	3	1	4	2	2
Number of months	19	15	23	41	12	uncertain
Workers	139	78	42	501	61	65

Construction of the project will require an estimated 125 345 cubic meters of concrete, 212142 cubic meters of rock material, 22 774 cubic meters of clay, and 12,192 cubic meters of filter material, and much smaller amounts of other materials (steel, wood, etc.). Clay will be taken from a borrow pit near Gorenci village, gravel from the borrow pit Venec, alluvial material from the riverbed where the dam will be built, limestone from a borrow pit near the dam, and rock from the new headrace tunnel.

Cement for the construction site will be brought 140 kilometres from the cement factory "Usje" in Skopje, and there will be three batching concrete plants at the construction sites.

7. IMPACTS AND MITIGATION MEASURES

This section describes the potential impacts on environmental resources and on people that the project could cause, and describes many of the actions that will be taken to prevent, reduce, or control these potential impacts.

a. Potential impacts on air quality

In the construction phase it is expected local deteriorations in air quality within the immediate locality of the project area.

Many construction activities can generate dust during dry periods, including movement of vehicles and equipment on unpaved roads or bare ground, storage and use of soil and construction materials, blasting, clearing of vegetation, stone crushing, and concrete batching. In dry periods when dust is visible, dust control measures will be required, including wetting roads and construction sites. In addition, vehicles and equipment that burn fuel will have exhaust emissions, but keeping engines in good conditions will reduce them to a minimum. During operation, there may be very minor dust emissions from traffic on unpaved roads. In addition, there could be odours from decaying vegetation when the reservoir is filled for the first time. For that reason, vegetation will be removed before the dam is closed.

Overall, there should be no significant impacts on air quality during construction or operation, and minor impacts would be very localized and short-term.

Summary of mitigation: dust control when needed, engine maintenance, clearing vegetation before filling reservoir (vegetation clearing plan is required), and minimization of miles travelled (traffic management plan is required).

b. Potential impacts on climate

Burning fuel in vehicles and equipment will release greenhouse gasses. In addition, vegetation decaying in the reservoir would release greenhouse gases. However, generation of electricity with hydropower instead of burning coal will reduce greenhouse gas emissions by about 107,000 tonnes per year. Overall, the project will not contribute to climate change.

Summary of mitigation: engine maintenance to reduce emissions, clearing vegetation before filling reservoir,

c. Potential impacts of noise and vibration

Noise can be a nuisance to people, especially in rural areas such as this one, where there is little background noise other than light traffic. Also, noise can be heard at long distances and is much more disturbing during the night.

Construction activities will cause an increase in ambient noise, and so will need to be carefully monitored and controlled. The primary activities that will cause higher noise levels are truck and equipment traffic, equipment and vehicle operating noise on construction sites (especially the dam and powerhouse areas), blasting during tunnel excavations, stone quarrying, and concrete batching. The main source of vibration of the project area is likely to be blasting during tunnel excavation and stone quarrying. The dam site is about a kilometre from the nearest village so there should be no significant disturbance of people, and there are no residents near the powerhouse location. Except for the tunnel excavation, work will be in two shifts, with no night-time work. Although tunnel excavation will be 24 hours a day, there will be no blasting at night, and most of the tunnel is far from villages. Noise will be monitored at key locations, and actions will be taken to reduce noise if levels are excessive, especially if there are complaints.

During operation, the only significant source of noise will be the turbines in the powerhouse, with very minor electrical noise at the new substation and transmission line. Noise from the turbines should not be audible very far from the powerhouse, and no one lives near.

Summary of mitigation: construction during daylight except tunnelling; blasting only during the day; monitoring and (if needed) changes to practices; blasting management plan; notice to residents of major construction activities and blasting.

d. Potential impacts on water quality.

Because construction will be in or near water, there could be impacts to surface water quality if proper controls are not used. If there were impacts on water quality, this could affect fish and

other aquatic organisms, and also could damage aquatic habitat. Potential impacts, and the ways they will be avoided or controlled, include:

- *Accidental spills* of fuel or oil from vehicles and equipment working in or near the water. Vehicles and equipment will be well-maintained and inspected and will have spill cleanup kits; drivers and operators will be trained.
- *Erosion* of solid material (mud, dirt, clay) into the water:
  - When construction works are performed near or in the riverbed (at the dam site, intake sites, bridge construction sites, and the powerhouse discharge site).
  - Erosion of solid material into the water by storm run-off from areas cleared of vegetation or otherwise made bare.

  An erosion control plan will require use of best international practice to prevent erosion. Rivers will be observed daily (for coloured or muddy water, for example) and work practices will be changed as needed to prevent water quality impacts. In addition, there will be weekly laboratory analyses of water samples to verify compliance with water standards.
- *Release of sanitary wastes* (sewage) from work sites and the construction camp. Portable toilets or other authorized management methods (for example, authorized septic system) will be used.
- *Release of solid material* in wastewater from tunneling and concrete batching plant. If water is to be discharged, it will be treated as needed to meet Macedonian discharge limits.

Overall, the impact of construction on water quality should be minor and temporary, although there could be short-term incidents with more serious impacts.

During operations, potential impacts will be much less threatening, and can be controlled so they are insignificant. Potential impacts and mitigation include:

- Decaying vegetation in the newly filled reservoir could cause low oxygen levels in the water. As noted above, a vegetation clearing plan will ensure that vegetation is removed as much as possible, so this should not be a problem. Even so, water will be monitored for dissolved oxygen and actions will be taken to oxygenate the water if needed.
- Taking water from the reservoir for five hours per day will lower the reservoir level about five metres. Until the reservoir refills overnight, there will be a narrow band of bare ground on the “shoreline” where vegetation will probably not be able to grow. There could be some erosion from this narrow band from storm run-off and possibly

from wave action. This should not be significant. If erosion is noted, the area will be stabilized with stone or some other means to prevent erosion.

- Leakage or rupture of a siphon could lead to very localized erosion until the intake could be shut off. This is not expected to occur, and if it did it would not cause a significant problem.
- Removing and discharging sediment from settling ponds near intakes and from the reservoir could cause increases in turbidity (cloudiness) in surface water if not carefully controlled. Sediment "sluicing" from the reservoir will be done only during high river flows, which would already have high turbidity and so would not have a significant impact. Sediment removed from sediment traps near intakes will be managed only as authorized by authorities and will never be discharged into the rivers.

Overall, operation of Boskov Most HPP will have no significant impacts on water quality.

Summary of mitigation: An erosion control plan will require the use of best international practices. A vegetation clearing plan will prevent vegetation decay in the water. Monitoring will allow any problems to be identified and repaired quickly. Sanitary wastes will be managed so there is no release that violates Macedonian standards. Sediment will be managed only as authorized by authorities, and sediment sluicing will only occur during times of high river flows.

e. Potential impacts on surface water flows and shallow groundwater

Most of the water in the Mala Reka and its tributaries will be sent down a tunnel to the powerhouse. This will reduce the amount of water that flows in the rivers. This reduction in flow rates will reduce aquatic habitat and could damage populations of fish and other organisms that live in the water. As described in section (i) below, the project will maintain at least "biological minimum flows" in all rivers, and this should prevent significant impacts on biodiversity.

In addition, the reduction in the amount of water in the rivers could affect shallow ground water in some locations, including:

- During construction, falling groundwater levels associated with dewatering and groundwater extraction during the construction of the dam. If this occurs, it would be temporary, since dewatering will end when the dam is complete, and also would affect only a limited area since the gorge is very narrow.
- During operation, lowered groundwater tables in the riverbeds downstream of the dam and of the intakes. This should not cause significant problems except along one reach of the river Garska, which is described in section (i).

- During construction, contamination of groundwater by the same events described for surface water in section (f) above (accidental leaks and spills, release of sanitary sewage, etc.). This will be prevented as described above.

Summary of mitigation: Mitigation: release of “biological minimum flows" and continuous monitoring of flow rates, monitoring of shallow ground water on the river Garska.

f. Geology

There will be no significant impacts to the geology either locally or regionally during construction and operation.

Summary of mitigation: no specific actions are needed beyond what is already being required.

g. Soil

Soil can be affected in two primary ways: loss of topsoil due to ground clearing for roads and other construction sites, and contamination from accidental spills. Topsoil will be recovered when the ground is disturbed and then stored until it is needed for rehabilitation later. Significant impacts due to contamination will be avoided as described under section (b) above.

Summary of mitigation: topsoil salvage and management program, spill kits in all vehicles and equipment, training for all drivers and equipment operators, response plan for spills.

h. Erosion

Soil erosion can cause high concentrations of suspended solids (dirt, mud, clay) in surface water, and this can smother aquatic habitat and reduce the amount of light that enters the water. Both of these things can have an adverse effect on fish and other aquatic organisms.

Daily fluctuation of the water level and the wave action at the edge of the reservoir may cause some soil erosion, especially while reservoir water levels are low and un-vegetated banks are exposed. However, any minor wave erosion, around the margin of the water storage will be negligible compared to the volume of sediment delivered to the storage area through major flood events. No erosion is expected at the outlet channel of the power house as this small length of the river will be protected within a concrete channel.

Overall, erosion could cause significant effects on water quality if not controlled. Following the erosion control plan will ensure the best international practices are used and this should prevent significant impacts, except possibly from occasional short-term incidents. A monitoring program that requires samples to be collected at least weekly will ensure water quality standards are met; in addition, all rivers downstream of construction sites will be observed daily and if it appears the water is cloudy or otherwise being affected, action will be taken to find and correct the cause.

***Summary of mitigation*:** erosion control plan, repairs and stabilizing if erosion does occur, weekly sampling and analysis, daily observation.

i. Biodiversity

As described above, most of the project lies within Mavrovo Natoinal Park, which is proposed for the Emerald Network and will be a candidate Natura 2000 site. The area is rich in biodiversity, both plant and animal.

Plants. The project area is mostly forested (about 70 percent of areas to be affected are forest) and there are many rare and important plant species, including horse chestnut, black hornbeam, turkey oak, black ash, ramondia, astragalus, carex and others. One important area lies along the river Garska, where 50-80 ancient chestnut trees grow along about 2 to 3 kilometers of the river. This is one of only four such relict chestnut-hornbeam forests in the Balkans (that is, forests that are remnants of once-widespread forests). The chestnuts require their roots to be in contact with moisture from shallow groundwater, and lowering the water flow in the rivers could make groundwater levels be deeper. In addition, all the rivers suport some level of riparian vegetation, which over time would be affected by less water in the rivers; in general, it is likely that riparian areas will grow smaller over time and be replaced by upland vegetation.

During the operational phase the mix and availability of some edible plants (green tea, mushrooms etc) and flower species may change due to the expected improvement and accessibility of the Region as more visitorsand tourists come into the area and pick them. This should not be significant.

Several actions will be taken to reduce impacts on plants:

- A vegetation clearing plan will be prepared, and reviewed by Park administration, and it will define how and where trees and other plants can be cut. It will also require that no more vegetation be cut than is absolute necessary, espeically in riparian areas.
- A monitoring program will record the conditions of selected chestnut trees and the levels of shallow groundwater during at least the first few years of operation. If groundwater gets deeper and this has an effect on chestnut trees, then biological minimum flows in the river Garska (see below) may need to be increased, or other actions taken to raise the level of shallow groundwater.
- Areas that are no longer needed for construction or operation will be revegetated with native species.

Large mammals. The area has been used by lynx and their large mammal prey and these could be disturbed or otherwise affected. Noise and disturbance during construction phase could alter the movement patterns of some of the larger animals that may roam widely across parts of the

project area. Removal of some parts of the forest communities, especially in the flatter areas may also affect some animal species. Several actions will serve to control the significance of the impacts. Noise and disturbance will mostly be confined to daylight hours, which is when most large animals are active. Disturbance away from the immediate construction sites will be kept to a minimum, which will reduce the area of impact.

Small mammals. Small mammals (primarily rodents) that would live in the project area would be relatively mobile. Although there will be some loss of habitat that could affect local populations, there should be no effect on species populations. Such small changes in the population of small mammals should not have a significant impact on the food chain for larger carnivores.

Radika River catchment area and Mala Reka, as a part of it, provides potential habitat for otters. The reduction in flow rates, would reduce the amount of habitats. Maintenance of the water flow, full implementation of the Vegetation clearance management plan, preconstruction bio monitoring and continuous (5 years) bio monitoring will be a base for eventual additional protection of the habitats.

Aquatic and semi-aquatic organisms (amphibians, insects). The reduction in flows, and the consequent reduction in the riparian area, will reduce habitat for amphibians. Although local populations may be affected, there are no known endemic species that are found only here, so there should be limited impacts on any species population. A multi-season monitoring program prior to construction will allow the development of further mitigation measures if they are needed to protected amphibians or other aquatic species.

Construction activities in the river will contribute to reduction in habitat for insects, and in composition and structure of insect related communities. Typical inhabitants of rapid, cold and highly aerated mountain rivers would be affected at instream work sites and possibly for short distances downstream. This would reduce local populations of mayflies, caddisflies, and stoneflies and other species. Similarly, reductions in flow rates would affect insect populations in all streams from which water is taken. Again, this would affect local populations but would have no significant effect on species populations. In addition, maintenance of minmum biological flows (see below) will ensure that the ecosystem is not significantly affected.

Birds. About 77 bird species may possibly be found in the project area and surroundings, although no significant bird sanctuary exists in the immediate area or nearby surrounding areas. Construction activities would cause temporary (although up to 3-4 years) disturbances that would drive birds away during breeding season and vegetation clearing would remove some of their habitat.

Fish. During the construction seasons, the brown trout will normally be found downstream in Mala Reka and Radika and not in the smaller upstream tributaries. Spawning takes place in late fall and early winter, so construction will not affect spawning. Construction in the rivers would remove some reaches of the rivers from use by brown trout and other fish. In most rivers,

construction should only take part of one season, which would reduce potential impacts significantly. At some sites, including the dam, reservoir, and powerhouse tailrace, construction will take place over more than one construction season. Here, construction could have a more important effect that could affect local populations.

Increased turbidity of the water (due to the construction activities) will also have an adverse impacts on the population of young brown trout. When turbidity will occur, this population will migrate to the main watercourse (Garska or Mala Reka) and will be possible food to the adult fish population of trout.

The dam itself will provide a barrier for fish movement upstream and downstream. This will isolate fish populations, including the brown trout, upstream of the dam, which can have adverse effects on future populations. Fish will be monitored upstream of the dam and, if needed, a stocking program will be developed to allow young fish from downstream of the dam to be transplanted above the dam so as to maintain genetic diversity.

The biggest potential impacts on fish and other aquatic organisms would be from reduced flows in the Mala Reka and its tributaries. Less water means less habitat and less food, and these can threaten populations; it also can restrict fish movement. To ensure the continued integrity of the aquatic ecosystem, the amount of water that can be taken from each river will be defined so that a certain amount of water will always be left. The “biological minimum flow” for the Boskov Most HPP was established by an expert biologist who estimated the water level that must be maintained in each river in each month of the year in order to protect brown trout and other important species. These water levels were then converted to flow rates, and this is the “biological minimum flow,” with a different rate for each month in each river. If natural flows are below the minimum biological flow (some of the rivers dry up in summer and others get very low), then no water will be taken. To ensure that minimum biological flows are always maintained, ELEM will implement a continuous monitoring system that will measure the amount of water that is taken from each river and the amount of water that is left in the river. In addition, ELEM will implement a fish monitoring program that will be able to identify any changes in populations that can be attributed to the project. If needed to protect key species, the biological minimum flows will be recalculated.

Summary of mitigation:

- Implementation of the vegetation clearance plan will ensure that no excess trees and vegetation will be cut.
- Implementation of the spill control and response program will reduce the potential for significant impacts that could affect biodiversity.
- Implementation of the erosion control plan will reduce impacts on water quality and on fish and aquatic habitat

- Implementation of a comprehensive biomonitoring program will allow biodiversity to be fully characterized so changes can be detected, which will allow corrections to activities to reduce impacts.
- Implementation of the monitoring program for horse chestnut trees and shallow groundwater will allow changes in biological minimum flows in the river Garska if needed to protect the ancient trees.
- Implementation of the program to continuously monitor water in the rivers will allow recalculation of biological minimum flows in any stream where there are adverse impacts due to the project.
- If needed, a fish stocking program will be developed for the reservoir and upstream tributaries.

j. Potential impacts on landscape and visual resources

The area within the construction zones will be temporarily changed during the construction phase. Most of the construction area is not visible from roads or public areas, although dam, reservoir, and some tunnel areas may be visible from trails in the Park. After the completion of the construction activities, and according to the obligations under Macedonian legislation for construction, the micro–relief and vegetation in these areas will be subject to restoration; plans rehabilitation and for landscaping will require the use of native species and will be designed to minimize the impact on visual resources.

The most widespread change would be that associated with the new reservoir. This new lake would replace the existing trees and pastureland. The other main change in visual appearance is the construction of the powerhouse between the Elenov Skok and Boskov Most bridges.

Figures 5, 6, and 7 illustrate the main changes in landscape and visual resources.

Summary of mitigation: landscaping plan (including use of tree screens, etc.), land rehabilitation plan, unobtrusive colour of powerhouse.

Figure 5. Aerial view of the reservoir

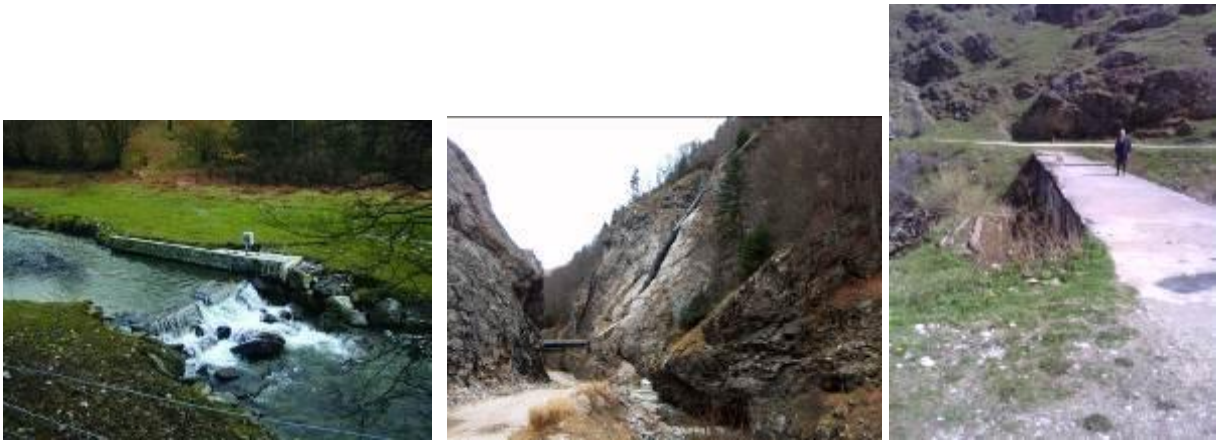

Figure 7. These pictures show examples of an intake (left), siphon (center) and aqueduct (right)

Figure 7. *This picture shows how the powerhouse will look*

k. Waste

Construction will generate a variety of solid wastes, which could include cleared vegetation (especially on the reservoir site but also along roads, the tunnel route, and the powerhouse site), domestic waste (for example, paper, glass, plastics, food waste), construction waste (for example, steel, tyres, ceramics, packaging material, asphalt), and hazardous waste (for example, used batteries, unused paint). With the exception of vegetation and spoil, solid wastes will be managed in accordance with Macedonian law, primarily by licensed haulers, and will not be disposed in the National Park. Cleared vegetation will be managed in accordance with the vegetation clearing program, and will not include burning without specific permits from the authorities; the program will also need to be reviewed by the National Park administration.

By far the biggest volume of waste will be spoil from excavating the tunnel, with much smaller amounts from the dam foundation and road construction. Approximately 100,000 cubic meters of spoil will be generated from the tunnel. Some will be used in the construction and rehabilitation process, such as for road base, embankments, and landscaping. A larger amount, perhaps 30 to 40 percent, will be placed in the footprint of the reservoir, where it will be covered with water when the reservoir fills. None of the remaining spoil will be disposed in the National Park, but will be taken off-site to licensed areas, including the Municipal landfill in Debar. , or used as cover or construction materials as allowed by Macedonian law. Most of the remaining waste material will be disposed on a regular municipality landfill site in Debar.

During operation, only minor amounts of domestic wastes will be generated by the approximately 25 employees. In addition, a relatively small amount of sediment will be removed from sediment traps at the intakes. Both types of waste will be managed in accordance with Macedonian regulations.

Summary of mitigation: two waste management plans, one for earthen wastes (spoil, sediment) and the other for non-earthen wastes, avoidance of disposal in the Park or near water.

I. Natural heritage

The project area is largely in the Mavrovo National Park which is a Green Diamond designated area and will likely be designed a Natura 2000 area in the future. All areas of the National Park are in one of four zoning categories, and the project area is within zone 3, which provides for sustainable use and does not prohibit such developments as hydropower plants. .

As noted in previous sections, construction activities may disturb some natural systems in the project area and its immediate surroundings. The construction activities are assessed as being local, limited in duration (4 years maximum for construction) and precautionary measures for the different construction activities have been set out in an Environmental and Social Monitoring and Management Plan (see Table 3 below) and an Environmental and Social Action Plan (also available for public review and comment) that will be enforced by EBRD.

Planning and management of the project area will be undertaken in close cooperation with the Mavrovo National Park. Large adverse impacts are not expected and it is extremely unlikely that construction and operation of the project will have any impact on the designated protection status of the Park

Summary of mitigation: see all previous sections for relevant mitigation of potential impacts; close communication between ELEM Mavrovo National Park administration during planning, construction, and operation.

m. Potential cumulative impacts

As shown in Figure 3 above, most of the Boskov Most HPP will be in the southwest part of Mavrovo" National Park. Several other hydropower plants have been proposed in the Park, and this section reviews whether all these plants together would have a significant impact on the Park.

In the northern part of the Park, the Lukovo Pole storage is proposed, along with the Crn Kamen SHPP. The location is over 40 kilometres (air distance) from Boskov Most and not in the Mala Reka watershed, so the effects of these two projects will not be related to the impacts of Boskov Most HPP.

To the northeast of the Mala Reka valley, about 10 kilometres (air distance) from the Boskov Most HPP, three small HPPs are planned to be constructed on the river Galicka Reka -- Galicnik 1, 2, and 3. Similar to the projects in the north of the Park, these projects are not in the Mala Reka watershed, so the effects of these projects will not be related to the impacts of Boskov Most HPP.

In addition, a small HPP is planned to be constructed upstream on the Tresonica River above the village of Tresonce. At present, it is planned to be constructed before the main construction begins for the Boskov Most HPP. This HPP does not require a dam or reservoir to be constructed, but would take water from the river for a very short distance. This minor diversion could affect fish populations in the Tresonica River, which could also be affected by the downstream Boskov Most HPP (the dam would prevent fish from moving between the Mala Reka and the Tresonica River).. The monitoring program that will be implemented for the Boskov Most project, including upstream of the dam (see section (i) above), will allow any changes in fish populations due to the project to be identified so that fish stocking or other actions can be taken to ensure there are no significant impacts

Although these widely dispersed projects will not affect the same resources, there is concern that so much additional development will change the character of Mavrovo National Park and make it less attractive for its natural amenities. It is important to note that all of the Park is not strictly protected: it contains roads that connect the many villages, along with grazing and some agriculture. This is acknowledged in the zoning of the Park, which allows different levels of

protection and development. As described above, the Boskov Most HPP is in a part of the Park that allows sustainable use. It is believed that hydropower development, in that it is a renewable resource, is an important sustainable use whose development is consistent with the current zoning. In addition, National Park authorities are currently in the process of "re-valorization" as part of the normal Park management process. During this process, it is anticipated there will be decisions made concerning the level of development that is appropriate and the level of protection that will be provided to Park resources. .

n. Potential disasters and hazards

Potential risks and hazard that may be associated with the Project in construction and operational phase are:

- natural risks;
- risk of hazardous substances spill;
- risk of fires;
- risk of traffic accident;
- risk from object failure (dam, pipeline, etc);
- injury of workers etc.
- Public safety associated with the reservoir

In general, worker injuries, fires, and traffic accidents are the most likely to occur. Soil or water pollution risk is low to medium, because only small quantities will be used and workers will be trained on management and cleanup. Emergency planning will reduce the significance of impacts from any of these events. ELEM and all contractors will be required to implement an occupational health and safety plan to protect all workers. A vegetation management plan will ensure there are no accumulations of fuel (dead wood and other vegetation) and an emergency response plan will describe what people should do in case of fire. Finally, a traffic management plan will set speed limits, require driver training, and describe routes for trucks and other vehicles, and this should significantly reduce the potential for traffic accidents.

Although the possibility of dam failure is extremely low, it could produce an extremely dangerous flood situation due to the large volume of water that would be released and the limited amount of time for warning and evacuation procedures. Breaching may occur within hours after the first visible signs of a failure. A catastrophic dam failure would impact village Osoj with 4 winter inhabitants, farming and pastureland, the Elenov Skok bridge, and nearby roads. The scale of the worst flood event and possible damage caused (including possible loss of life) and loss of amenity will be assessed in the study on the "Probable Maximum Flood" that will act as the base for the preparation of a Dam safety management plan. It is noted that the

dam will be designed to withstand extreme earthquakes, much more severe than would be expected to occur in a period much longer than the estimated 100-year lifetime of the dam.

Summary of mitigation: emergency response plan, traffic management plan, vegetation management plan, dam safety management plan (including study of probable maximum flood).

o. Potential impacts on people

People from the Mala Reka region (specifically, from Tresonce, Selce, Rosoki, Susica, Gari, and Lazaropole villages) were known as excellent masons, cattle keepers, icon and fresco painters, wood carvers, teachers, artisans, revolutionaries, etc. Six of the seven villages in the affected area -- Tresonce, Selce, Rosoki, Lazaropole, Osoj and Gari – now have only a few residents in winter. The only village in the affected area with a significant year-round population is Mogorce., However, all become live, vivid villages during the summer, with many pensioners who were born here returning to live from April through September.

The famed bridge “Elenski Skok” over the Mala Reka is known for its unique construction and is another symbol of culture identifying the affected area. This minor copy of the large bridge over the Neretva River in Mostar, Bosnia and Herzegovina, which was built by the same architect, is becoming an attractive touristic location.

Strong cultural and historical bonds connect people who originate from these villages. They are managing to revive the abandoned households of their parents, at least for the summer. They continue to build maintain connections and interactions with people in their villages and nearby villages. These bonds are carefully transferred to the younger generation, which maintains the sense of identification with the location and subgroup ethnic culture and values. People from Tresonce and Selce use the meadows that connect the two villages for cultural, sport, and leisure activities. On these meadows are a small chapel and derelict barn.

The project will have an effect on the people who live here and who visit. There will be a temporary increase in population as several hundred workers will live in the area during the 8-month construction seasons over the four years of construction. ELEM will encourage contractors to hire local workers when they have the right skills, which can benefit the economy. However, workers from outside can have an adverse effect on local populations, and this will need to be controlled with strict rules for workers in the construction camp near Osoj as well as others who may live in the villages.

The closeness of Tresonce to the Dam construction area may negatively affect local residents due to worker movements in and around the village. In addition, residents in Tresonce and other villages near construction sites – especially Rosoki and Osoj villages -- could be affected by dust (see section (a) above) and noise and vibration (section (c)), and their visual landscape will change (section j)). The could also be indirectly affected if there are changes in water quality

(section (d)) or biodiversity (section (i)). As noted in these sections, proper mitigation will ensure there are no significant impacts on people in these villages.

The influx of people and the increase in activities in the area could cause greater interest in building additional weekend houses by people from outside. This could cause changes in the local social network, including having an effect on common values and maintenance of the local cultural tradition. Possible employment opportunities may cause some people to return to the area for longer periods of time. This could put more pressure on infrastructure and the social network.

Some land and houses will need to be acquired, particularly in the dam and reservoir area. This will be done through negotiation and agreement with the owners as a part of voluntary resettlement and land expropriation. For those who will lose their houses and /or their land to the reservoir or other project structures, a Land Acquisition and Compensation Plan will set the rules for activities related to relocation and fair compensation.

In three areas, buildings may be damaged or destroyed by construction or by filling the reservoir:

- Tresonce: The reservoir will flood five weekend houses, one home, and one old house/stable in the Kadievci neighbourhood as well as some private yards. In addition, the presence of the reservoir and higher humidity could damage protected frescos and icons in Sveti Petar i Pavle and Sveti Nikola churches. The Land Acquisition and Compensation Framework will ensure that owners of houses or land that must be acquired will not suffer economically. A cultural heritage plan will require that frescos be conserved and protected.
- At the junction of the rivers Tresonecka and Jadovska Reka, also near Tresonce, the reservoir will flood a cemetery and the Chapel Sveta Parakseva. Again, the cultural heritage plan will require the chapel to be replaced, and a separate plan will be developed to ensure graves in the cemetery are moved to higher ground.
- Rosoki: A few weekend houses and a family house may be damaged, and nearby construction could damage the Church Vovedenie na Bogorodica Church, a protected building. The Land Acquisition and Compensation Framework will ensure there one suffers economic losses. The cultural heritage plan will ensure that impacts on the church are minimized. In addition, the construction management plan will specifically require that construction activities minimize impacts on the houses.

Construction of the project will also require that some electricity lines be moved and that some roads be reconstructed and possibly relocated (see section 5 above)>

One of the most important potential impact will be from increased traffic, which can increase the number of accidents and also damage road infrastructure. There will be significant increases in

traffic, mostly from trucks carrying spoil from the tunnel and cement from Skopje. In all, traffic on area roads will increase from a very few vehicles, mostly cars, per hour to 17 or more heavy trucks per hour. The roads where there will be the most traffic are those that run along the Mala Reka between Tresonce and the powerhouse. This increase in traffic will not only damage the roads, but will significantly increase the probability of accidents between vehicles and with pedestrians and animals. Also, traffic will be higher during the warm months, when there will be more people in the area, which further increases the possibility of accidents. To reduce the potential impacts, there will be a traffic management plan developed in consultation with authorities. This plan will require:

- Very strict speed limits
- Specific routes for trucks to avoid unexpected traffic.
- Training for drivers and operators.
- Signs and notices along heavily travelled routes, and special notices to residents when there will be exceptional traffic.

The source of drinking water for Debar is in Rosoki, and water flows through a pipe to that runs along the road to Debar, much of which will be reconstructed (see section 5 above). The line will need to be moved or reconstructed, which will be done so as to minimize any temporary disruption of the water supply.

Construction activities will occupy a certain amount of land used for agricultural activities. This will not dramatically change the way of life of permanent residents, since agricultural activities in the planned construction locations are very limited. However, about 15 hectares of pastureland and orchards will be flooded by the reservoir and additional pastures will be taken for the power house. Also, some residents from Mogorce will suffer small economic impact from acquisition of pastures and meadows near the junction of Mala Reka and Garska Reka, or land that they rent in Osoj. Most of the agricultural land that needs to be acquired is not in active use. Even so, owners or users will be fairly compensated for any economic losses and for the loss of their land.

Summary of mitigation *(see details above):*

- Land Acquisition and Compensation Plan
- Traffic management plan
- Special pedestrian paths to be created alongside new or widened roads;
- Routing new directions for recreational walking in Tresonce and Rosoki, particularly the existing roads to Galicnik (Rosoki) and Lazaropole (Tresonce).
- Cultural heritage management plan
- Plan for cemetery location.

- Frequent communication with local residents and authorities to inform them about current and future activities and to listen to their concerns.

p. Residual impacts

As summarized above and described in more detail in the ESIA and in the Environmental and Social Action Plan, a wide variety of mitigation measures will be required. These are intended to prevent, reduce, or control the potentially significant impacts that could be caused by construction and operation of Boskov Most HPP. These measures cannot completely eliminate all impacts, however. In addition, some potential impacts cannot be predicted with certainty. For that reason, there will be extensive monitoring to verify that impacts have been identified and that mitigation is working as planned. Monitoring programs will include noise, water quality, air quality, plants and animals, fish and aquatic species, horse chestnuts and groundwater levels, the amounts of water taken and left in the rivers, and others. The results of monitoring will be used to modify construction or operating practices in order to reduce impacts, or to develop or modify current mitigation measures so they can do a better job of reducing impacts. Impacts that will remain after mitigation are shown in Table 2.

Table 2. Residual Impacts

	Residual impacts	
Media	*Construction phase*	*Operation phase*
Air quality and Climate change	- Temporarily minor impacts from dust emissions and higher PM_{10} in ambient air in dry periods from traffic on earthen roads, blasting, and other construction activities. - Minor increases in greenhouse gasses from engine emissions and vegetation decay, mitigation will reduce both.	- Negligible effects on air quality - Very small addition of greenhouse gases - Much larger reductions compared to electricity generation with coal.
Noise and vibration	- Some nuisance noise levels due to traffic, machinery, and blasting activities, but very minor effects to the public. - Monitoring will allow noise reductions as needed.	- Very minor noise near the powerhouse, otherwise negligible.
- **Surface water**		
Surface water hydrology	- Negligible -	- Reduced flow in Mala Reka and tributaries. - Pulsed flow from powerhouse into Mala Reka and to Radica River.
Shallow ground water (under riverbed)	- Disruption in flow due to construction at dam, intake, and tailrace locations.	- Reduction in groundwater table due to reduced surface flow

Table 2. Residual Impacts

	Residual impacts	
Media	*Construction phase*	*Operation phase*
Surface water quality (erosion)	- Major erosion and turbidity possible unless properly controlled. - Mitigation (construction practices, monitoring) will reduce erosion and turbidity - Minor erosion will remain after mitigation, leading to temporary increased turbidity - Construction in rivers will increase turbidity temporarily	- None expected - Monitoring to allow action to be taken to prevent low dissolved oxygen and high suspended solids
Biodiversity		
Terrestrial flora	Partial or full clearing of vegetation from 82 hectares of forest and 8.5 hectares of meadowland	- 1-2 horse chestnut trees may be lost due to siphon construction across Garska Reka - Monitoring and adaptive management should prevent impacts due to lower groundwater levels on Garska Reka
Terrestrial fauna	- Loss of 85 hectares of forest and 8.5 hectares of meadow habitat, which are lightly used by animals, including large mammals, for food, nesting/resting, and migration. - Birds and other animals will avoid the area on and near the project site due to noise and human activity.	- Equilibrium will be restored, with some loss of forest and pastureland fauna and habitat as noted. - Reservoir may present a barrier to movement of large mammals, including lynx
Aquatic flora and fauna	- Some loss of habitat and destruction of aquatic vegetation and non-mobile fauna in Mala Reka and tributaries due to work in the rivers (construction of dam, intakes, and tailrace). - Fish and other mobile organisms will be forced to leave areas where work is occurring in river. - Sediment could smother downstream aquatic habitat if erosion is not controlled. - Mitigation will reduce impacts and monitoring will allow adjustments to minimize impacts.	- Potential adverse effects due to reduced flows - Effects to be monitored and operations/mitigation will be adjusted as needed to reduce impacts
Landscape and visual impacts	- Some construction will be visible from villages (especially Tresonce and Rosoki) and from roads. - Possibly some activities will be visible from hiking trails in Park.	- Reservoir will blend in to forest landscape. - Changing water levels may cause temporary minor negative visual impact.
Waste	- Potential impacts on soil and water from improper management. - Mitigation should prevent impacts.	Negligible.

Table 2. Residual Impacts

	Residual impacts	
Media	*Construction phase*	*Operation phase*
Nature protection	See biodiversity and landscape impacts	See biodiversity and landscape impacts
Transport and roads	- Significant increase in truck and equipment traffic, increased potential for accidents and nuisance impacts. - Proper management will reduce impacts.	Negligible

8. ENVIRONMENTAL AND SOCIAL MANAGEMENT AND MONITORING PLAN

An Environmental and Social Management and Monitoring Plan has been developed as part of this ESIA. It summaries the organizational requirements, actions and monitoring plans to ensure that the necessary measures are taken by ELEM to avoid or control potentially adverse effects - and maximise potential benefits - of the project. It also is intended to ensure that ELEM operates in compliance with applicable laws and regulations of Macedonia, as well as EBRD requirements (which in turn require compliance with European Union requirements). The overall responsibility for this Plan lies with ELEM, even when specific actions are carried out by their contractors. The Plan is summarized in Table 3, and key requirements include:

- **Investor internal management capacity:** ELEM will need to establish and maintain an organisational structure that defines roles, responsibilities, and authority to implement environmental and social requirements, including appointment of one or more managers responsible for environmental/social performance and for occupational health and safety on the project site.
- **A Contractor Management Process**: Much of the construction will be done by various contractors engaged by ELEM. ELEM is required to develop and implement procedures to employ and manage all contractors to ensure that the contractors are fully aware of the relevant environmental and social requirements, and are responsible for complying.
- **Annual Environmental and Social Performance Monitoring and Reporting:** ELEM will need to undertake periodic monitoring/audits throughout the period of construction and operational phase of the project. Results will need to be documented and disclosed to stakeholders through the Stakeholder Engagement Plan. In addition, ELEM will report to EBRD on the status of all requirements of the Environmental and Social Action Plan.

Table 3. Highlights of Environmental and Social Management and Monitoring Plan

No	Action	Timetable Action
1.	*Preconstruction phase-* Conducting a baseline survey of the built and natural environmental conditions, as well as biodiversity and habitats, along the selected construction routes. water quality, soil quality, biodiversity (aquatic biodiversity, terrestrial flora and fauna, with strong emphasize on macro invertebrates, large mammals, birds and chestnut).	Before start of Construction. Before start of construction
2.	*Preconstruction and construction phase* Contractot to undertake Preparation and Implementation of the Construction management plan-	before starting the activities and during the construction phase
3.	*Preconstruction and Construction phase* Preparationof Pollution, prevention and abatement management plan – Contractor to develop a environmental management system for the duration of the project that conforms to ISO14001	From the beginning of activities for cleaning the location-the finishing the construction activities
4.	Construction Establish a dust concentration and deposition monitoring network	Prior the constructive phase and throughout the whole constriction phase.
5.	Preparation of Noise and vibration management plan based on the Detailed Construction Management Plan, which will include: ✓ Surveying of any protected objects in the construction routes, checking whether noise limits values are met. ✓ Design of temporary noise barriers ✓ Monitoring of noise standards during the cleaning the site, construction and operating phase.	Before starting of construction
6.	*During the designing and construction period*: Preparation and implementation of Top soil management programme	Before starting of construction
	Preconstruction& Construction: Develop and implementation erosion and sediment Management plan, which will include installation of appropriate sediment traps and ponds in work areas.	Before starting of construction
7.	Construction and first 5 years of operation: Developing a comprehensive Bio-monitoring programme for the habitats and species in the Project area, on the base of conducted environmental baseline Survey and finding of the Study prepared. Develop and implement monitoring plan for horse chestnut population and habitat along Garska River, including: - Key statistics and conditions of representative specimens of varying ages and locations - At least monthly groundwater levels along at least three cross-sections of the river where chestnuts grow Data must be sufficient to characterize baseline groundwater levels seasonally and relative health of tree specimens	during the operational phase (5 years duration)

No	Action	Timetable Action
8.	Construction A Vegetation Clearance Management Plan	Before starting of the construction/filling of the reservoir
	Post construction and Operational Developing of Rehabilitation/revitalization Plan	as soon as possible after disturbance
9.	Preparation a Landscape Design and Management Plan for the design and construction of the dam wall, associate embankments, spillway, siphons, aqua duct and visually exposed infrastructure and management of night lighting.	Before starting of the construction
	Prepare Landscape Master Plan for the inundation area	during preparation of Main design
10.	Designing process, construction and operation phase: Implementation of the Fish Stocking Action plan	During project cycle
11.	Designing process: Prepare Management Plan for sustainable development of the Project area site.	During the preparation of the Main Design in close cooperation with the Mavrovo National Park Administration and MoEPP.
12.	Designing process& construction& operational phase: Preparation and implementation of the traffic management plan	during preparation of the main design and project cycle
13.	Preparation of waste management Plan which includes clearing phase, construction phase and operation.	During preparation of the main design
14.	Preparation and implementation of the Soil contamination plan.	During the construction and operation period
15.	Preparation of Water management Plan which will include surface and ground waters in the cleaning, construction and operational phase.	For the project cycle
16.	Preparation of Water Monitoring Plan which will include surface and ground waters in the cleaning, construction and operational phase. Strong emphasize will be put on hydrology of the rivers and control on the minimum biological flow.	For the Project cycle
17.	Start to record the flow at the intake areas and the dam site. Installation of the online monitoring system for the rivers in Mala Reka catch man area	Immediately Before start of operation
18.	Develop Emergency response procedure and staff training	Preparation before starting of construction and implementation during construction and operation phase .
19.	Finalization and implementation of Land acquisition and compensation plan (LACP)	Before start of the construction/filling of reservoir
20.	Create and implement a Cultural Heritage Management Plan (CHMP)	Framework prepared prior to start of construction. Detailed

No	Action	Timetable Action
		plans prior to start of relevant activities.
21.	Preparation of Management plan for worker engagement.	Prior construction phase
22.	Create workers grievance mechanism	Prior construction phase
23.	Prepare and implement Community H & Safety plan	On the beginning of the activity

A detailed Environmental and Social Action Plan (ESAP) has been prepared to ensure that construction and operation of Boskov Most meets the EBRD's Environmental and Social Policy and Performance Requirements. The ESAP is being disclosed for public review and comment at the same time as the ESIA. After being revised as needed to address comments during the disclosure period, the final ESAP will be part of the agreement between ELEM and EBRD and will be monitored by the Bank to ensure compliance.